PATENT ABSTRACTS OF JAPAN

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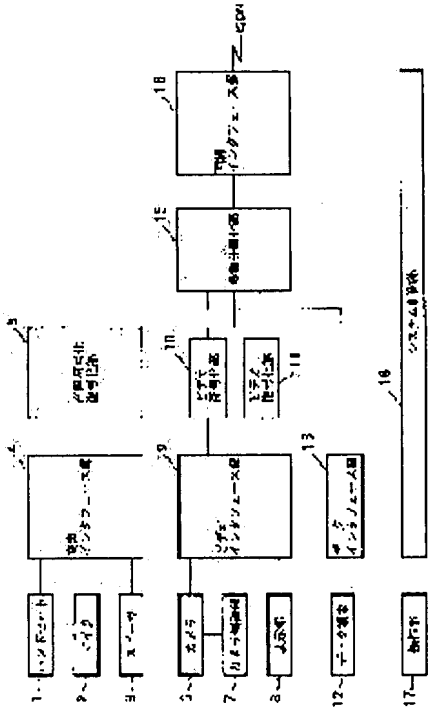
(54) VIDEO CODER

(57)Abstract:

PURPOSE: To obtain sufficient picture quality by suppressing quantity of arithme tic operation much needed at the time of the calculation of motion vectors in a conventional coder in the system of a high efficiency coder for a video source employing inter-frame prediction.

CONSTITUTION: The coder is provided with a camera control section 7 measuring a moving quantity of a camera 6 at every frame and with a video coding section 10 whose retrieval range is optionally changed at the time of motion vector calculation so that retrieval range is changed depending on the moving quantity of the camera. That is, the video coding section 10 identifies the position in a frame from a frame GOB number, increases the retrieval range of a motion vector in the middle of the frame and decreases the retrieval range of a motion vector at ends of the frame at the characteristic of the motion vector.



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CLAIMS

[Claim(s)]
[Claim 1] Video coding equipment characterized by having a movement magnitude measurement means to measure the movement magnitude of the camera in every frame, and an assignment means to specify the motion vector retrieval range from the measurement movement magnitude of this movement magnitude measurement means, being motion vector retrieval within the limits specified with said assignment means, calculating a motion vector, and performing a motion compensation.
[Claim 2] Furthermore, it is video coding equipment according to claim 1 characterized by having a discernment means to identify the location in a frame, and for an assignment means having the function to specify the magnitude of the motion vector retrieval range, and changing the magnitude of the retrieval range of a motion vector with the location of a frame.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the video coding equipment which performs high efficiency coding of the video source using inter-frame prediction.
[0002]
[Description of the Prior Art] In recent years, the communication service utilization by the ISDN circuit is started, AV (Audio Visual) service of the TV phone, video conference system, etc. using such a digital channel attracts attention, and the service convention for AV service, protocol specification, and a multimedia multiplexing frame structure convention are announced as CCITT advice (or advice draft) H.320, H.242, H.221, H.261, etc.
[0003] H.261 has prescribed coding and the decryption method of a dynamic-image signal in the rate of px64 kbit/s (p=1-30). In H.261, since it had the frequency band where a picture signal is large, the video signal high-efficiency-coding equipment (video codec) which compresses this was developed. The method which combined with the inter-frame prediction using the redundancy of the direction of a time-axis conversion coding which reduces the spatial redundancy of a prediction error as an algorithm of video signal coding in this conventional video signal high-efficiency-coding equipment is taken.
[0004] And a motion compensation can be used in inter-frame prediction. The motion compensation calculated difference with a front screen as a motion vector per macro block (16x16 pixels), and had transmitted this value. Decryption equipment reproduced the motion vector per macro block, and was reproducing the image by reception, the front frame, and the motion vector. The vector which decreases even if an error with an applicable macro block has from the interior of a frame of the front screen used as the candidate for coding, in order to calculate the value of a motion vector in the video coding section is calculated, and it is ******.
[0005]
[Problem(s) to be Solved by the Invention] When all retrieval range is calculated, for example at the time of motion vector count, the amount of operations increases and coding stops however, this conventional approach being of use. On the other hand, if the retrieval range is narrowed, it becomes impossible to follow a motion and sufficient image quality cannot be acquired.
[0006]
[Means for Solving the Problem] This invention was made for the purpose of solving an above-mentioned technical problem, and is equipped with the following configurations as a way stage which solves an above-mentioned technical problem. That is, it has a movement magnitude measurement means to measure the movement magnitude of the camera in every frame, and an assignment means to specify the motion vector retrieval range from the measurement movement magnitude of this movement magnitude measurement means, and it is motion vector retrieval within the limits specified with the assignment means, and a motion vector is calculated and a motion compensation is performed.
[0007] And for example, an assignment means has the function to specify the magnitude of the motion vector retrieval range, and is equipped with a discernment means to identify the location in a frame

otherwise, and an assignment means changes the magnitude of the retrieval range of a motion vector with the location of a frame.
[0008]
[Function] In the above configuration, the retrieval location of a motion vector is changed according to the movement magnitude of a camera. For example, if a camera moves rightward, the vector retrieval range will be specified as the right-hand side of a macro block. Moreover, while being able to reduce the amount of vector operations by changing the magnitude of the retrieval range of a motion vector according to the location of the macro block in a frame, for example, enlarging the retrieval range of a motion vector in the center of a frame, and making the retrieval range small in the part of the edge of a frame, the image quality of a screen center section can be raised compared with a periphery, for example.
[0009]
[Example] the following and a drawing -- therefore, one example concerning this invention is explained. Drawing 1 is the block diagram showing the configuration of the multimedia communication equipment of one example concerning this invention. In this drawing, the hand set whose 1 is one of the voice-input/output means of this equipment, the microphone whose 2 is one of the voice input means of this equipment, the loudspeaker whose 3 is one of the voice output means of this equipment, and 4 are the voice interface sections, and perform switch processing which switches the hand set 1 as a voice-input/output means, a microphone 2, and a loudspeaker 3 with directions of the system control section 14. Moreover, the voice interface section 4 performs generation processing of tones, such as echo cancellation processing for eliminating an echo and also a dial tone, ringing tone, a busy tone, and a ringer tone, etc., when a microphone 2 and a loudspeaker 3 are used as ON / off-hook detection processing in which it detects in any a hand set 1 shall be between a condition on hook or an off-hook condition, and a voice-input/output means.
[0010] 5 -- directions of the system control section 14 -- sound signal (8kbps) coding of (64kbps PCM A-law), (64kbps PCM mu-law), (64bps/56kbps/48kbps SB-ADPCM), (32kbps ADPCM), {16kbps (for example, APC-AB) etc.}, etc., etc., and a decryption algorithm -- therefore, it is the voice coding decryption section which decrypts coding and a receiving sound signal for a transmitting sound signal.
[0011] The camera for 6 being one of the image input means of this equipment, and inputting a self-portrait etc., The camera control section to which 7 measures the movement magnitude of a camera 6, and 8 A camera 6 or the receiving image from a partner, The display which displays an actuation screen etc., and 9 NTSC/CIF conversion, switch processing of a picture input device, The video interface section which performs picture signal composition processing for indicating the switch processing and them to the display 8 of an input image, a receiving image, and an actuation screen by division on a display 8 etc., 10 -- CCITT advice draft H.261 -- therefore, it is the video coding decryption section which encodes a transmitting image, and motion compensation inter-frame prediction in this example is controlled. Moreover, 11 is the video decryption section which decrypts a receiving picture signal.
[0012] A data terminal for 12 to perform data communication and 13 are the data interface sections which manage the interface of a data terminal 12 and the demultiplexing-ized section 15, for example, output the commo data from a data terminal 12 to the demultiplexing-ized section 15. 15 -- the CCITT advice H.221 -- multiplex / separation-ized section which divides a receiving frame into each media of a configuration unit, and is notified to each part while multiplexing BAS from the sound signal from the voice coding decryption section 5, the picture signal from the video coding section 10, the data from the data interface section 13, and the system control section 18 per transmitting frame, respectively, and 16 -- an ISDN user and a network interface -- therefore, it is the circuit interface section which controls a circuit. [therefore,]
[0013] Moreover, control units, such as a keyboard used for a control information input for 17 to perform control of this equipment at large and a touch panel, and 18 are the system control sections which are equipped with CPU, ROM, RAM, an auxiliary storage unit, etc., supervise the condition of each part, and perform control of the whole this example equipment, creation of the actuation/display screen according to a condition, activation of an application program, etc.

[0014] The relation and detail explanation with the camera control section 7, the video interface section 9, and the video coding section 10 of this example in the above configuration are shown in drawing 2 . In the configuration of drawing 2 , motion compensation inter-frame predicting coding is performed. In drawing 2 , 9-1 is a NTSC/CIF transducer which is contained in the video interface section 9 and performs NTSC / CIF conversion of a video signal. Moreover, 10-1 is a video coding control section, and 10-2 is a video coding network.
[0015] Coding processing actuation of the photography information on the camera 6 of this example equipped with the above configuration using the flow chart of drawing 3 is explained. First, at step S1, the video signal photoed with the camera 6 is sent to the NTSC/CIF transducer 9-1, and is changed into a CIF signal. The signal changed into the CIF signal is outputted to the video coding network 10-2.
[0016] On the other hand, the camera control section 7 measures reception and the amount vector of rotations in every frame of a camera (x y) for the frame alignment signal from the video coding control section 10-1 at step S2, and outputs them to the video coding control section 10-1. The video coding control section 10-1 is assigned to the conversion Fig. which shows the movement magnitude vector (x y) of the camera obtained from the coordinate shown in drawing 4 at continuing step S3 by drawing 5 , and computes the retrieval block positional variable c of 1-9. The conversion Fig. of drawing 5 divides into nine blocks of illustration of 1-9 **15 (pixel)x**15 (Rhine) which is the maximum retrieval range of a motion vector, and assigns a number to each block. The retrieval block location according to the value of the retrieval block positional variable c is decided from this drawing. The video coding control section 10-1 outputs the retrieval block positional variable c to the video coding section 10-2.
[0017] In the video coding section 10-2, the motion vector from which a prediction error serves as min within the limits of the block continuously specified by step S4 is calculated. According to this example, the amount of operations can be reduced like by [which were explained above] limiting the retrieval range at the time of motion vector count.
[0018]
[Other Example(s)] In the above explanation, for example in addition, the video coding control section 10-1 It assigns the conversion Fig. which shows the movement magnitude vector (x y) of the camera obtained from the coordinate shown in drawing 4 by drawing 5 . The retrieval block location according to the value of the retrieval block positional variable c was decided, the retrieval block positional variable c was outputted to the video coding section 10-2, and the motion vector from which a prediction error serves as min within the limits of the specified block was calculated in the video coding section 10-2.
[0019] However, in what is limited to the above example, there is no this invention and, therefore, it can attain the same operation effectiveness as ** to the following approaches. the 2nd example which starts this invention hereafter -- the flow chart of drawing 6 -- therefore, it explains. The flow chart of drawing 6 is processing corresponding to the number calculation processing of complete change of step S3 in processing of drawing 3 in the 1st example mentioned above, in the 2nd example, is changed into retrieval range calculation of step S3 of the 1st example, and computes the retrieval range by the processing shown in drawing 6 . In addition, other coding processing and another hardware configuration can be performed with the same configuration as the 1st example mentioned above.
[0020] In the retrieval range calculation in the 2nd example, the video coding section 10-2 numbers the block which divided into GOB of 12 and divided the inside of one frame of a CIF format as shown in drawing 7 . And the GOB number to which the macro block which corresponds in advance of motion vector count at step S11 belongs investigates whether it is "1", "2", "11", and "12." And since it is the edge of a frame if the GOB numbers to which the corresponding macro block belongs are "1", "2", "11", and "12", in order to make the inspection range into smallness, it progresses to step S12, and the retrieval range of a motion vector is set as the block of 10x10.
[0021] Since it is the center of a frame if the GOB numbers to which the corresponding macro block belongs on the other hand are not "1", "2", "11", and "12", in order to make the inspection range into size, from step S11, it progresses to step S13 and the retrieval range of a motion vector is set as the block of 15x15. And the same processing as next, for example, drawing 3 , step S4 and abbreviation is

performed, and the motion vector from which a prediction error serves as min in the retrieval range set up by processing of drawing 6 is calculated.
[0022] By calculating the motion vector from which a prediction error serves as min in the retrieval range explained above, computational complexity of a motion vector can be lessened like ****. In the 2nd example explained above, although the location in a frame was identified by the GOB number, a location may be further identified per macro block in GOB. Thereby still finer control can be performed.

[0023] In addition, even if it applies this invention to the system which consists of two or more devices, it may be applied to the equipment which consists of one device. Moreover, it cannot be overemphasized that this invention can be applied also when attained by supplying a program to a system or equipment.
[0024]
[Effect of the Invention] According to this invention, the amount of operations can be reduced like by [which were explained above] limiting the retrieval range at the time of motion vector count. Moreover, the image quality of a screen center section can be raised compared with a periphery.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of one example concerning this invention.
[Drawing 2] It is the block diagram showing relation and detail explanation with the camera control section, the video interface section, and the video coding section which are shown in drawing 1 .
[Drawing 3] It is the flow chart which shows coding actuation of this example.
[Drawing 4] It is drawing showing the example to which the camera movement magnitude (x y) and the movement magnitude variable of this example were made to correspond.
[Drawing 5] It is drawing showing the example which divided the retrieval range of the motion vector of this example into 9 blocks.
[Drawing 6] It is a flow chart about retrieval entry actuation of other examples concerning this invention.
[Drawing 7] It is drawing showing the location of GOB in one frame of the CIF format in other examples.
[Description of Notations]
1 Hand Set
2 Microphone
3 Loudspeaker
4 Voice Interface Section
5 Voice Coding / Decryption Section
6 Camera
7 Camera Control Section
8 Display
9 Video Interface Section
10 Video Coding Section
11 Video Decryption Section
12 Data Terminal Section
13 Control Unit
14 System Control Section
15 Demultiplexing-ized Section
16 Circuit Interface Section

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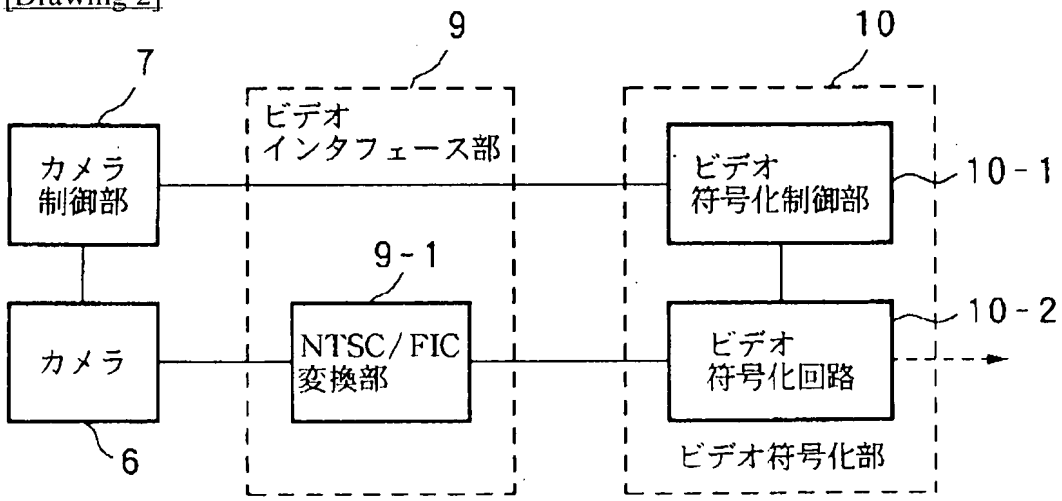
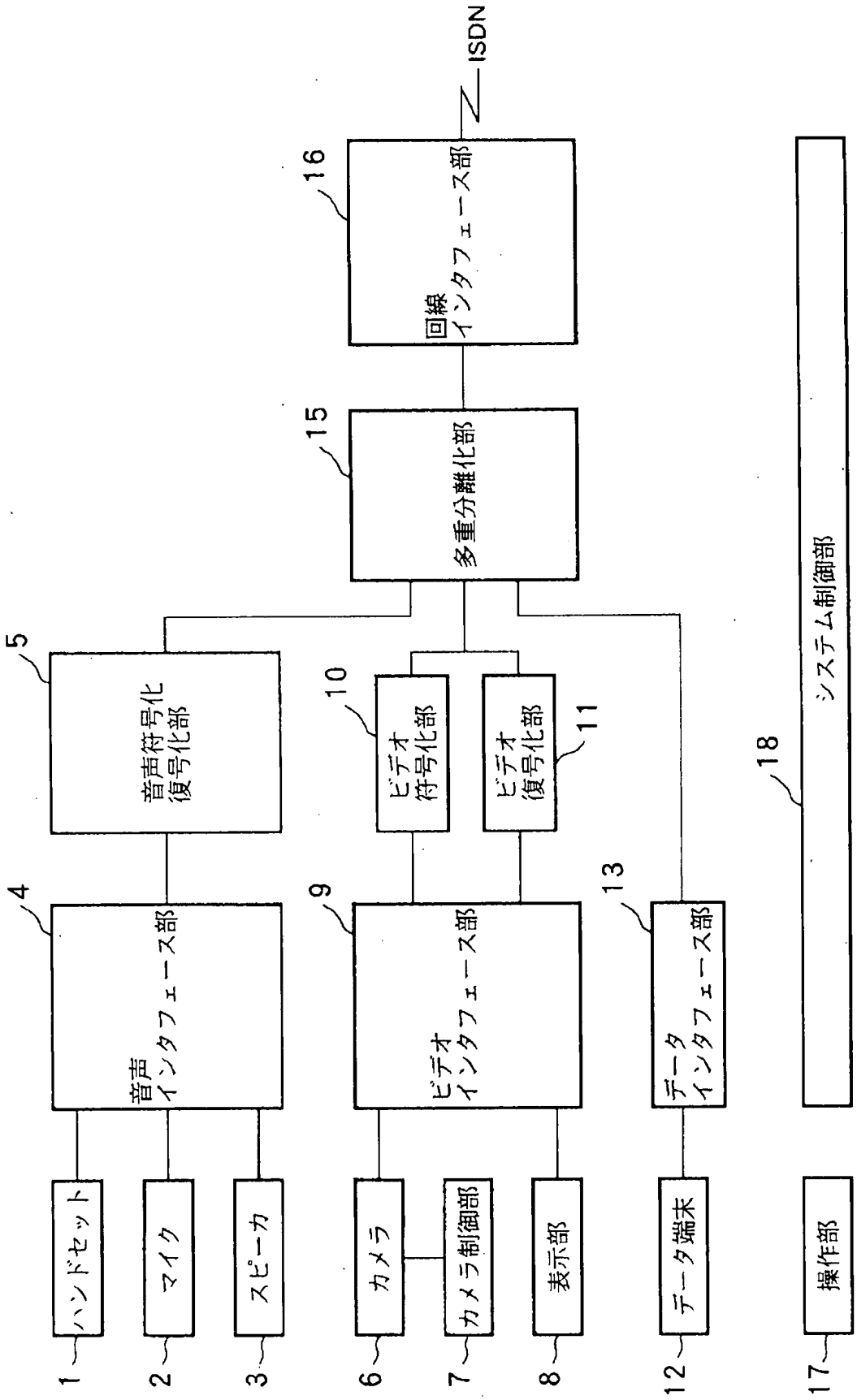
DRAWINGS

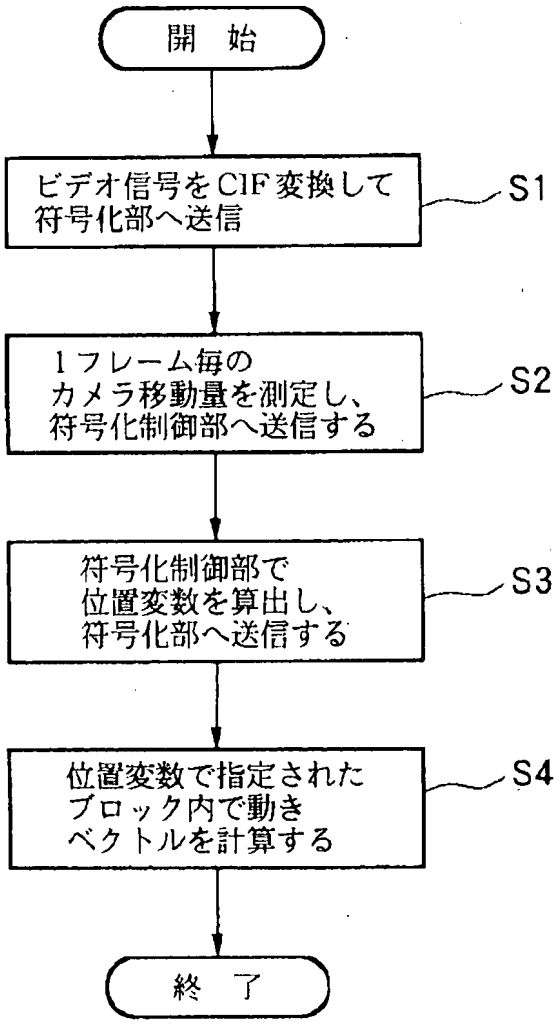
[Drawing 2]



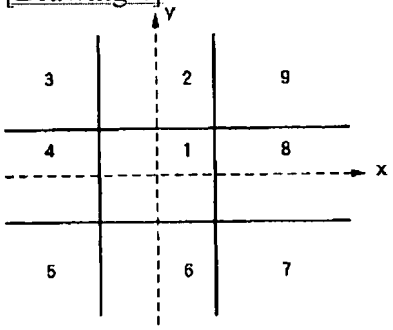
[Drawing 1]


ISDN
16
回線
インタフェース部
15
多重分離化部
5
音声符号化
復号化部
10
ビデオ
符号化部
11
ビデオ
復号化部
18
システム制御部
4
音声
インタフェース部
9
ビデオ
インタフェース部
13
データ
インタフェース部
ハンドセット
マイク
スピーカ
カメラ
カメラ制御部
表示部
データ端末
操作部
1
2
3
6
7
8
12
17

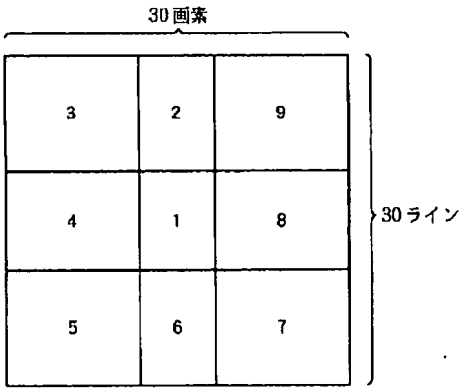
[Drawing 3]



[Drawing 4]



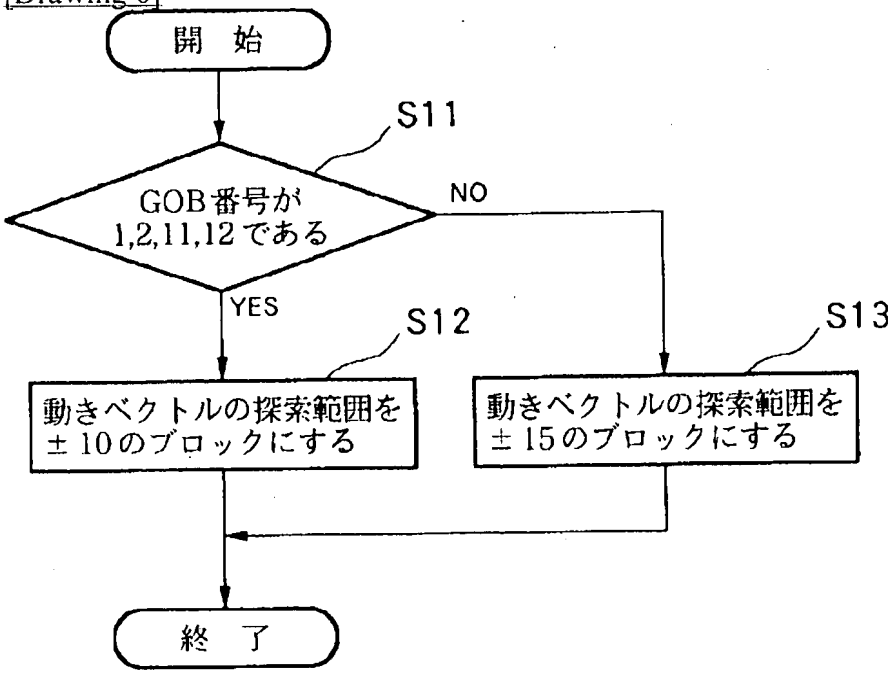
[Drawing 5]



[Drawing 7]

1	2
3	4
5	6
7	8
9	10
11	12

[Drawing 6]



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